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Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Lubrication in the Printing Industry

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LUBRICATION INDEX *for* VOLUME 9, 1923

	Month	*Page*
AUTOMOBILE OILS		
(Why Automobile Oils Must Be Periodically Renewed)	Sept.	97
CARE OF THE MOTOR CAR IN WINTER	Jan.	1
CONCRETE MIXING MACHINERY		
Lubrication of	June	69
DRIVING CHAINS AND THEIR LUBRICATION	Aug.	85
EXCAVATING MACHINERY		
Lubrication of	June	61
EXHAUST GAS POISONING	Jan.	12
FARMING MACHINERY		
Lubrication of Power	July	73
GREASE		
Its Manufacture and Usage	March	25
KNITTING MACHINERY LUBRICATION	May	49
MARINE RECIPROCATING STEAM ENGINES AND AUXILIARIES		
Lubrication of	Feb.	13
MOTOR CAR		
Care of the, in Winter	Jan.	1
POWER FARMING MACHINERY		
Lubrication of	July	73
PRESERVATION OF FISH NETS	May	60
PRINTING INDUSTRY		
Lubrication in the	Dec.	133
RAILWAY MOTOR CARS		
Lubrication of	Sept.	104
REFRIGERATION MACHINERY		
Lubrication of	Oct.	109
ROAD BUILDING MACHINERY		
Lubrication of	Aug.	92
SILK MILL MACHINERY		
Lubrication of	April	37
STEAM POWER PLANT PRIME MOVERS AND THEIR LUBRICATION	Nov.	121
STEAM TRACTION ENGINES		
Lubrication of	July	82
STEERING ENGINE AND DECK AUXILIARIES		
Lubrication of the	March	30
TEXTILE PRINTING MACHINERY AND ITS LUBRICATION	May	57
WHY AUTOMOBILE OILS MUST BE PERIODICALLY RENEWED	Sept.	97

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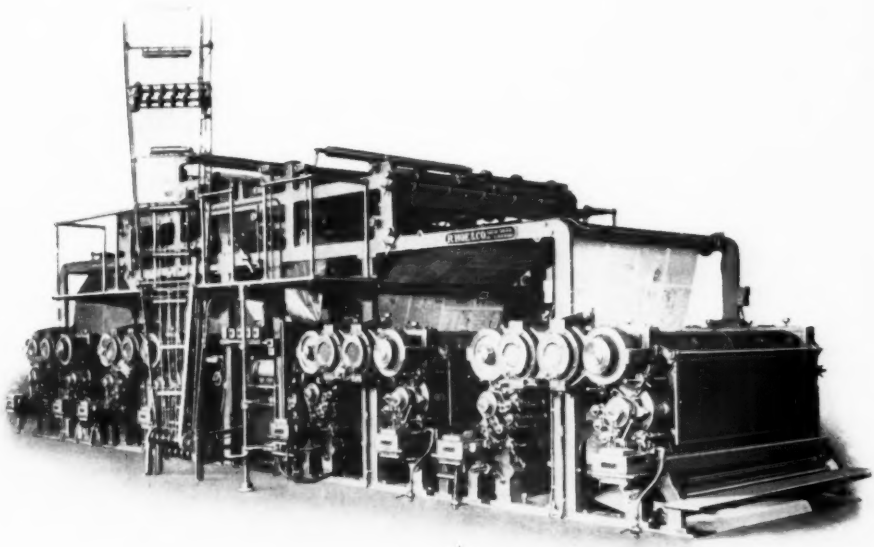


Courtesy of R. Hoe & Co.

Fig. 1.—Modern Rotary Web press of the high speed type.

Lubrication in the Printing Industry

FOUR hundred and fifty years ago, or thereabouts, history tells us the first book was printed in the English language by means of impressing the text from carved blocks of wood. The process was crude, slow and laborious, though productive of beautiful examples of the skill of the fifteenth century wood carver and printer. Due to the incredibly slow speed of operation and the cumbersome construction of the presses, lubrication of the moving parts in these early days was quite naturally unthought of.

The art of printing, however, developed rapidly. Likewise the inventive genius of the artisan came to the fore, and construction of printing machinery soon passed from the crude hand press stage, and earlier models of the modern platen and rotary presses appeared in use. Production was sought more and more, for science, art, in fact every phase of education, were regarded as dependent, to a great extent, upon the dissemination of printed matter in general.

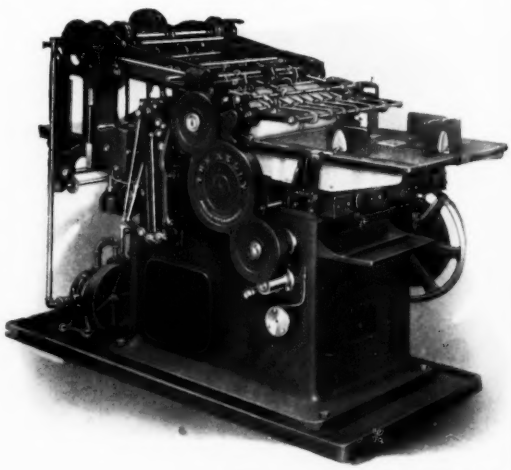
Increased production meant increased speed of operation, and dependable increased production quite naturally called for *lubrication* of the operating parts of the presses and other machinery. The printer readily appreciated that only could he keep his presses in continuous operation by properly lubricating their working mechanisms.

This intelligent and farseeing attitude has without a doubt played an important part in modern printing machine development. It points decidedly to the fact that unselfish cooperation between the artisan, the engineer and the lubricating specialist can assure any trade (whatever it may be) that the highest refinements in machine design, and the maximum economy in operation are attainable. In other words practical experience and scientific judgment must go hand in hand.

So the printing industry is to-day regarded as among the foremost in the civilized world, and one of the vital factors (if our egotism may be pardoned) which has enabled it to attain this envious position and satiate the desires of mankind for good reading,—is *lubrication*.

PRESSROOM MACHINERY

Broadly speaking, in the modern pressroom we will have to deal with presses of the platen, flat bed, and web types. In all, the primary purpose is similar, *i.e.*, the impression of printed characters, etc. from a plate or form to a single or continuous sheet of paper. But there is marked difference in the manner by which this is brought about. The platen press, for example, is a relatively simple piece of mechanism, as compared with the modern large rotary newspaper press. In this regard we can of course readily appreciate that the type of work which is to be done will influence the construction of the press. In the job press-room where the printing of cards, envelopes, circulars, and other short-run material of usually less than 50,000 impressions constitutes the bulk of the business, the platen press is frequently the most economical machine to use, due to the simplicity of operation, the rapidity with which the form can be made ready and registered, the facility with which the press can be changed from one job to another, and the fact that only one man is required on each press. In addition, the platen press requires but little power and floor space and an absolute register or alignment of printed matter is possible.



Courtesy of American Type Founders Co.

Fig. 2.—An automatic job press of the flat bed type which is adaptable to high speed short or long run printing. This is a two-revolution type of press.

On the other hand, where publications such as newspapers, magazines, etc. are involved, cylinder presses of the flat bed and web types are best adapted. Speed of production is one of the most important factors in this phase of the printing industry, so the rotary press with its ability to turn out thousands of impressions per hour has become actually a national necessity.

The Press Itself

A cylinder press is usually understood to mean a printing machine wherein the paper receives its impression by passing over one or more impression cylinders in contact with either a flat bed or similar cylinder which carries the plates of typographical matter. It is possible to print in either one or two colors on one side of the sheet on a flat bed press.

or to otherwise so design the press as to print in one or two colors on both sides of the paper in one operation.

In the modern *Flat Bed Press* the plates or type matter lie perfectly flat on the press bed, being securely locked in place. The paper is fed to the press guides in individual sheets, being carried by a suitable carrying device to the impression cylinder which in turning passes the paper through in contact with the type bed, to bring about the impression. The type bed is fitted with two or four sets of steel antifriction rollers which travel on steel tracks installed the full length of the press. In operation the bed travels backward and forward periodically, being actuated by a suitable crank mechanism driven by gears from the main drive of the machine. Accordingly as the direction of motion of the type-bed is changed the impression cylinder is automatically lifted from contact by means of suitable cam mechanisms, in order to permit it to move continuously in one direction. Two revolutions of the cylinder are made to one backward and forward movement of the bed.

The inking device consists of a fountain, several distributing rollers, an ink plate moving back and forth with the type bed, and several form rollers. Elastic composition and hard metal surfaces alternate, the fountain, ink plate and lateral distributors being metal, the ink rollers, form, ductor and regular distributors consisting chiefly of gelatine, sometimes of rubber or composition.

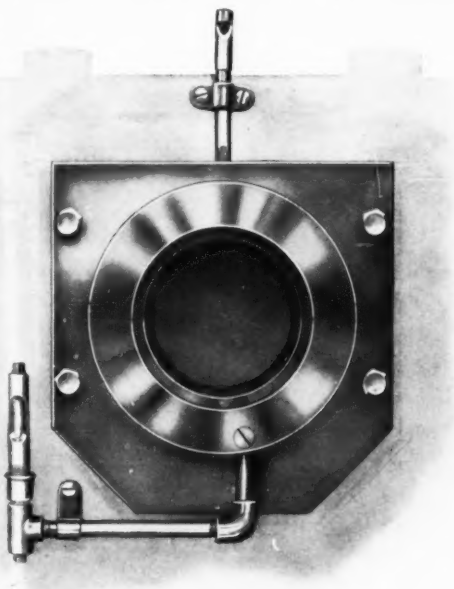
There are two sets of inking devices in the flat bed press designed for two-color work or the printing of both sides of the paper in one color at one operation.

The ink is rather tacky, and in order to insure as perfect and uniform a distribution as possible, the several distribution rollers through which the ink is passed before being applied by form rollers to the type plates, are usually arranged to move from side to side across the press with respect to each other during rotation. Their actual distance of travel is only a few inches, but the combination of rolling and sliding contact serves to effectively break up any larger particles of ink to suitable fineness and distribute it evenly along the length of each succeeding roll. The reciprocating motion of these vibrating rollers is brought about by means of cams which are especially designed for this purpose.

On the flat bed press it is customary to install two or four connecting air springs or cushions at each end of the machine in order to afford a temporary storage of energy when the bed approaches the end of its stroke. This accumulated energy serves to aid in starting the bed in the opposite direction, thus relieving the pressure and jar on the driving mechanism during this period of stopping and starting, and reducing the power required for operation. The benefits to be derived from air cushions can be the more readily appreciated when we consider that regardless of the speed of operation, the bed must come to an absolute stop on dead center, the change in motion taking place very rapidly.

In order for an air spring to function effectively, the piston must fit snugly in the cylinder, and yet be capable of entering with perfect freedom.

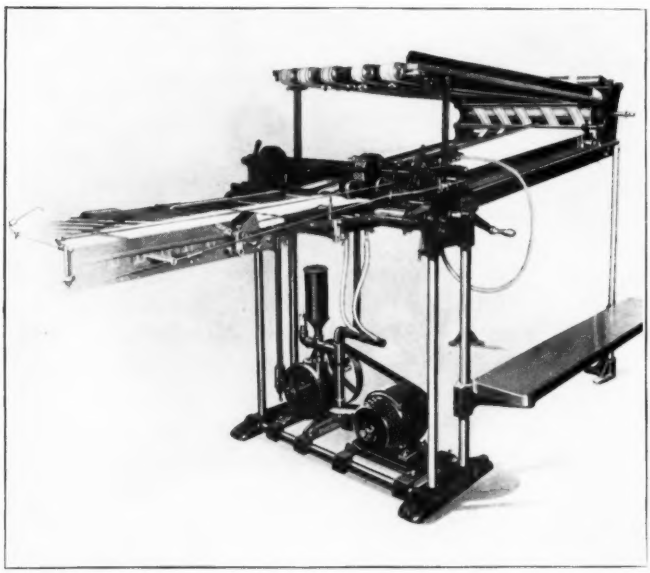
Leakage of air would, of course, be a detriment; therefore it is customary to equip the end of the piston with a leather cup packing. When properly installed, and of sufficient pli-



Courtesy of R. Hoe & Co.

Fig. 3.—Self-oiling box as used on certain types of high speed rotary web presses. Illustration shows the box ready to receive the cylinder bearing.

ability to conform to any minor undulations in the surface of the cylinder, this cup serves to trap the contained air upon entering, and to expand almost immediately due to the increasing pressure encountered. An effective seal is thus attained and the full benefits of the compression derived. Inasmuch as this seal will be practically entirely governed by the condition and manner of setting of the leather packing, it is most important to observe the greatest of care in handling the leather. Primarily it must be properly centered on the piston, capable of readily entering the cylinder, and quite soft and pliable.



Courtesy of George R. Swart & Co., Inc.

Fig. 4.—Continuous air wheel feeder designed for paper handling where excessive speed is required. A suction rotary air wheel handles sensitive paper stock without marring whatsoever.

To attain these objectives, afford as perfect a seal as possible, and bring about a minimum of power consumption for operation, lubrication has been found to be of the greatest benefit. In other words, the leather as well as the cylinder must be properly lubricated, so to speak. By lubrication of the leather we can generally assume the periodic soaking or boiling in neatsfoot oil, which is found advisable. The walls of the cylinder, however, are best served with a medium bodied, average melting point grease. A suitable film of such a lubricant will not only reduce rubbing friction to a marked extent, but as well, will insure against leakage of air much in the same manner as in an air compressor.

Flat Bed Press Lubrication

Probably the most important piece of mechanism in a flat bed press from the viewpoint of lubrication is the main driving gear or "star wheel". This gear carries the entire load of the machine and is subjected to heavy duty, considerable wear and oftentimes lack of attention due to its more or less inaccessible location beneath the type bed. Especially in cases where the air cushions are not functioning properly, or the pressure not absolutely equalized, will the star wheel receive the brunt of the detrimental effects. The abnormal jar resulting every time the press bed starts and stops will naturally subject the teeth to more or less severe and uneven shock, with the result that wear will be excessive or, in extreme cases, the teeth might be stripped or chipped.

To counteract any possibility of such occurrences it is advisable to keep the teeth well coated at all times with a good, adhesive, heavy-bodied lubricant, which will not only resist squeezing out but will be capable of furnishing a sufficient cushion to prevent metal to metal contact however severe the operating conditions. The melting point of such a compound must, of course, also be above any possible temperature that even extreme operation might involve. Otherwise the film of lubricant could not be relied upon to be permanent.

In other respects the average flat bed press will involve the lubrication of bearings, cams, roller gears and chains. It is usual practice to construct press bearings for hand oiling. Where externally located such as at the ends of ink rollers, etc., the bearings are often fitted with reservoirs located in the top bearing cap or to one side of the base. These reservoirs are customarily packed with waste and soaked with oil at regular intervals. Where bearings are located beneath the press or in any other more or less inaccessible position, oil piping is usually

run from the oil holes in the bearing caps to the side of the press. On certain flat bed presses special attention must be given to such parts as bed motion shaft boxes, flywheel shaft boxes, cylinder and eccentric boxes. In fact any bearing part located adjacent to the side frame or set in a close fit between the side frame jaws as are all types of cylinder boxes, require regular and careful oiling. Especially on these latter parts will the lack of oil give rise to a roughening of the wearing surfaces, etc. with the possibility of the cylinder being unable to take its full lift. As a consequence, impairing of the register or proper correspondence of the lines, etc. on opposite sides of the printed sheets may result.

For all bearing lubrication it is customary to use a straight mineral press oil having a viscosity of from 300 to 500 seconds Saybolt at 100° F. Oils that gum readily should be avoided at all times.

Cam surfaces and chain links are also best lubricated by this same oil, although certain press builders advocate grease in some cases. It must be remembered that however carefully a press is oiled or wiped after oiling, a certain amount of oil will always drain through plain bearings and find its way out along the end of the shafts to ultimately drip upon the mechanism below, or to the floor. Due to this occurrence there will practically always be a certain amount of free lubricant in the process of dripping and cams, gears, and chains will receive their share of it. So there is usually slight chance of any of such mechanisms being underlubricated, provided the bearings are properly attended to.

Miscellaneous gear lubrication on account of this possibility often becomes more or less of a problem. The usually recommended gear compounds will become materially thinned down on contact with oil, and their effectiveness thereby reduced. For this reason many pressmen prefer a relatively heavy grease with sufficient soap content to insure against too great a reduction in the body of the lubricating film. Others rely on the press oil to lubricate their gears, oiling the latter with the same care and regularity they observe for their bearings. On lighter gears, oil will prove a very dependable lubricant, but the heavier roll gears will usually function with less noise, less wear, and greater efficiency if a semi-solid lubricant is used.

As in practically every other industry, lubrication must be attended to regularly if best results are to be obtained. The flat bed press being distinctly a hand lubricated machine exemplifies this fact strongly. There is usually no oil reservoir of any extensive capacity installed anywhere in connection with the press, and grease cups are little used. So the human element is practically the deciding factor and the care and regularity with which the press mechanisms are lubricated will be a measure of the operating efficiency and rate of production attained.

In carrying out press lubrication the essential point to keep in mind is the function of each part requiring lubrication. It is not enough to simply squirt oil miscellaneously into every oil hole in sight or sluice the gears or bearings over generously. Not only will oil be wantonly wasted in such a case but as well both machine and floor will become an oily mess to endanger the safety of the operators. Far better is it to recognize the fact that every pair of surfaces in contact with each other possess a certain relation in their motion one to the other and therefore require a certain definite amount of lubrication at the points of contact in order to reduce solid friction as much as possible. Only by practice and observation can this theoretical oil requirement be approximately decided upon.

Another point that must be taken into consideration is the age of the press. It is perfectly evident that a new press will require somewhat more oil and greater frequency in its application than one which has been in operation long enough to run all its working mechanisms into a "running fit" with each other.

Difficulty that may also sometimes be encountered in press operation if lubrication is neglected is the bursting of ink rollers at the ends. Especially when running short forms on a flat bed press will considerable friction arise between the ends of the rollers and the dry surface of the ink plate. Therefore, in such cases, it is advisable to coat the plate beyond the inking line with a light or medium bodied grease in order to insure against abnormal friction arising.

Courtesy of T. W. & C. B. Sheridan Co.

Fig. 5.—Combined Gatherer, Wire Stitcher and Coverer, as extensively used in the magazine print shop. Insets of printed matter are fed to the gatherer on the right, carried automatically to the stitcher in the center, and thence to the coverer on the left from which the finished book is discharged, ready for final trimming.

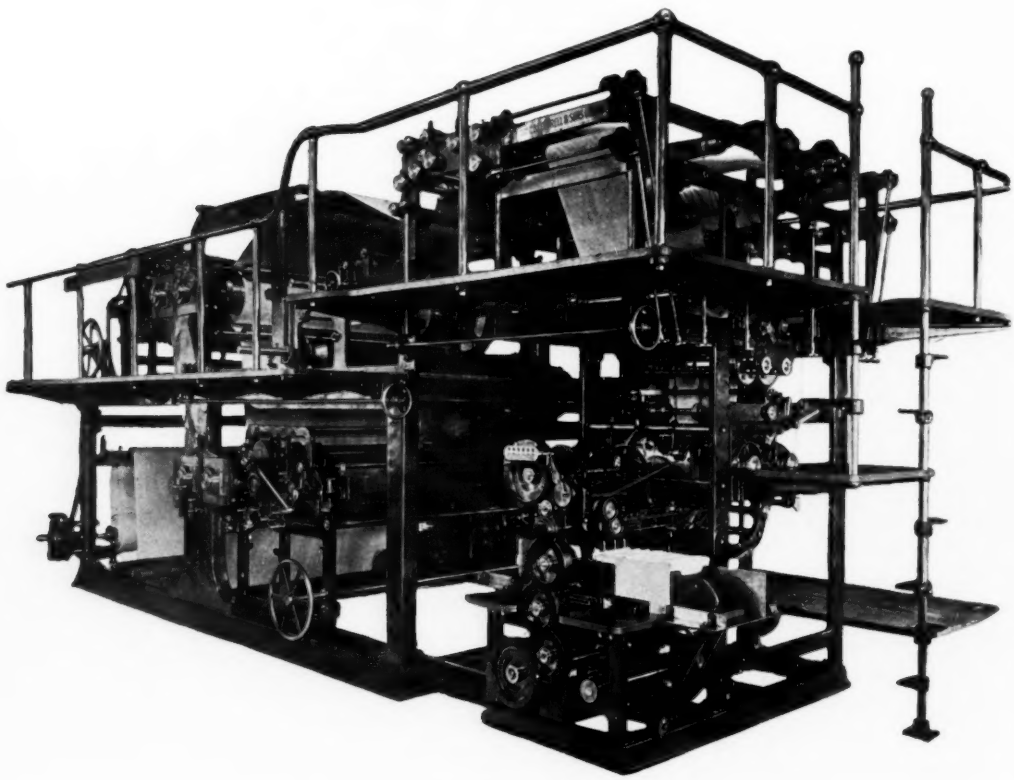
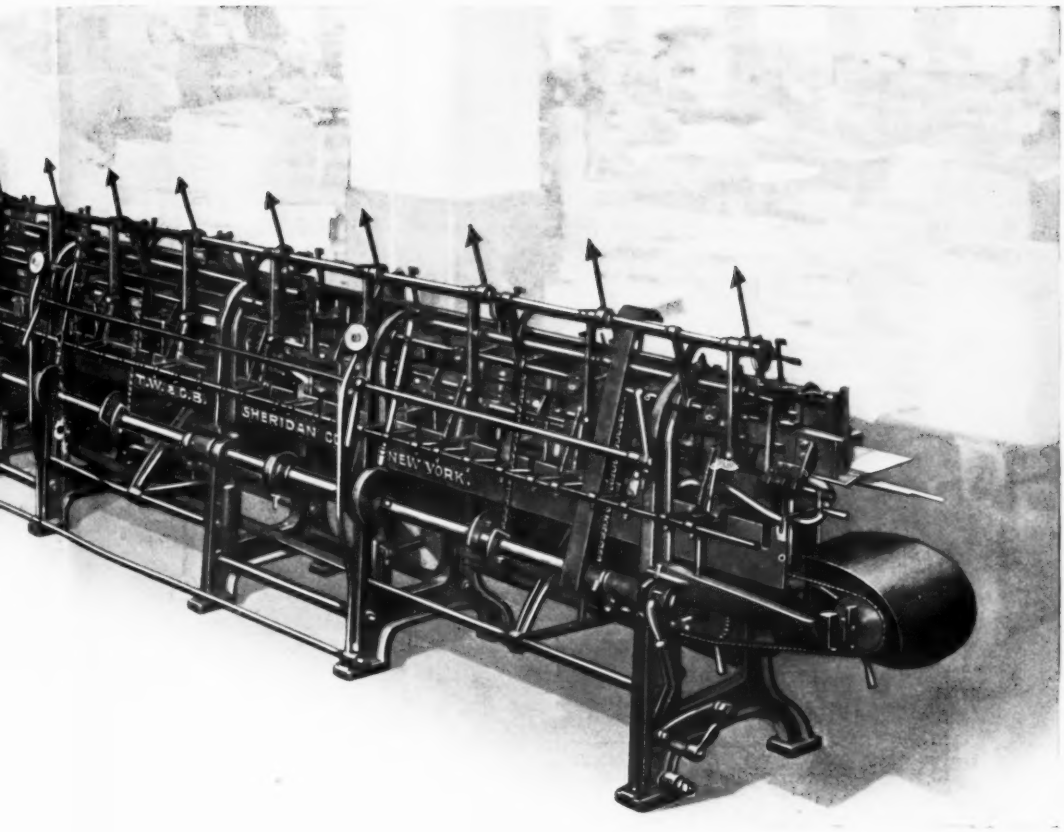


Fig. 6



Courtesy of C. B. Cottrell & Sons Co.

Fig. 6.—Rotary web magazine press built to produce 64 pages of copy, printed, folded and ready for binding at each revolution of the press.

Courtesy of The Miehle Printing Press & Manufacturing Co.

Fig. 7.—Flat Bed Press of the high speed, two-revolution, four-roller type. Presses of this nature are extensively used in the printing of magazine covers.

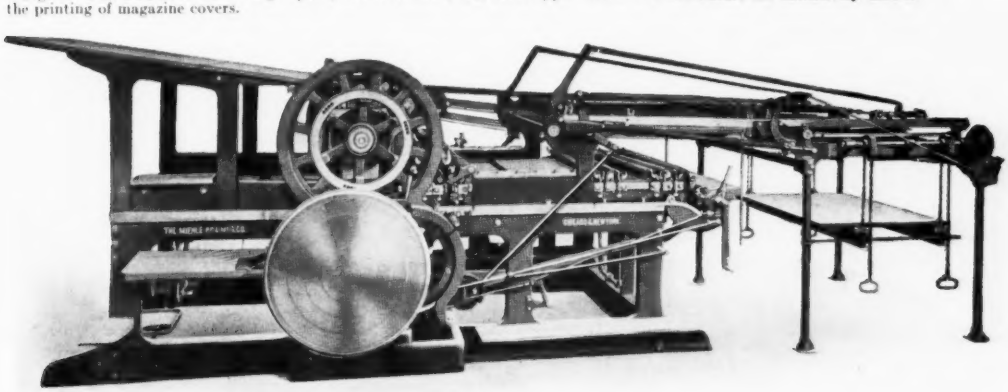


Fig. 7

The life of rollers can be materially lengthened by strict adherence to this rule and maximum production with minimum power consumption assured.

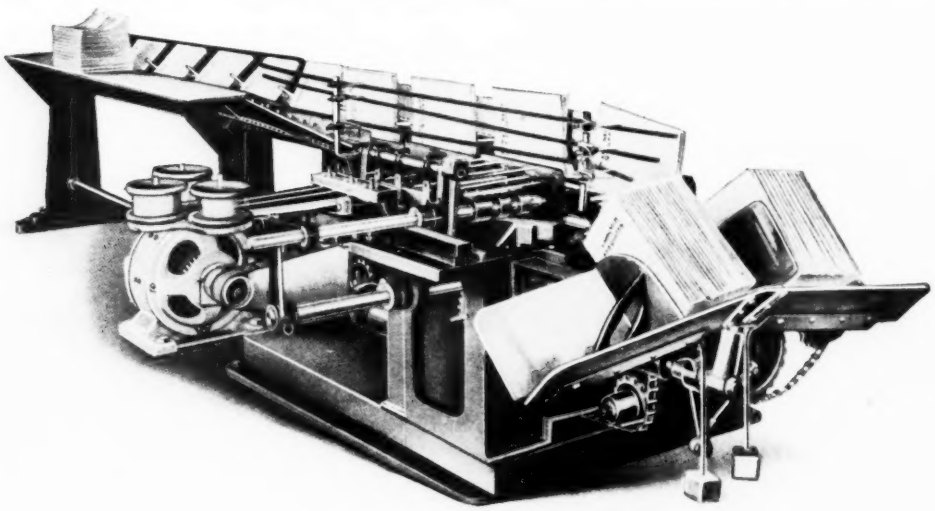
Having oiled the press thoroughly, it is then advisable to turn it over by hand a few times to see that the proper "feel" at the wheel is present. A competent press operator can develop a sense of judgment in regard to this "feel" which is of inestimable value in checking up on lubrication. In fact quite as essential as a knowledge of all parts requiring lubrication is the ability to judge whether these parts are functioning with a minimum of friction.

At frequent intervals, especially if the press is used intermittently, it will be advisable to rinse bearings, oil holes and waste pad reservoirs out with kerosene, especially if dirt or dust is prevalent in the pressroom or when certain grades of paper are used which develop "fluff".

The Web Press

The Web Press, so termed because of the fact that the paper is fed to it in a continuous sheet or web from a roll, is primarily used in the printing of newspaper and magazine material. Web Presses are usually rotary cylinder machines wherein the plates of typographical matter are curved to the diameter of the type cylinders and retained thereupon in proper relation to each other by means of a suitable locking device.

The modern web press is a complete producing unit in itself, by virtue of the fact that it can be so constructed as to print the paper on both sides, cut the printed web into pages along the proper margins, collect the necessary number of pages in proper numerical order into insets of desired size, fold the completed sets and deliver them ready for distribution by the newsdealers. Speed of output can be realized by noting the production of one of the latest types of "Superspeed" presses, which range from 80,000 papers per hour of a maximum of 16 pages inset, to 20,000 papers per hour of a maximum of 64 pages collected.



Courtesy of American Assembling Machine Co., Inc.

Fig. 8.—Detailed view of a continuous side stitcher or machine for binding books by means of driving wire staples to hold the insets.

The production of the web press when applied to the printing of magazine insets for newspapers is also of interest. Typical examples of such work are the comic sheets and colored supplements in our Sunday papers. One of the largest presses of its kind in the world is capable of printing in from one to four colors and the maximum production ranges from 144,000 8-page 2-color insets to 36,000 16-page, 4-color insets per hour. Varying combinations are also possible in between, depending upon the number of pages and color arrangements involved. The custom in many houses publishing magazine insets, etc., is to print, cut and deliver

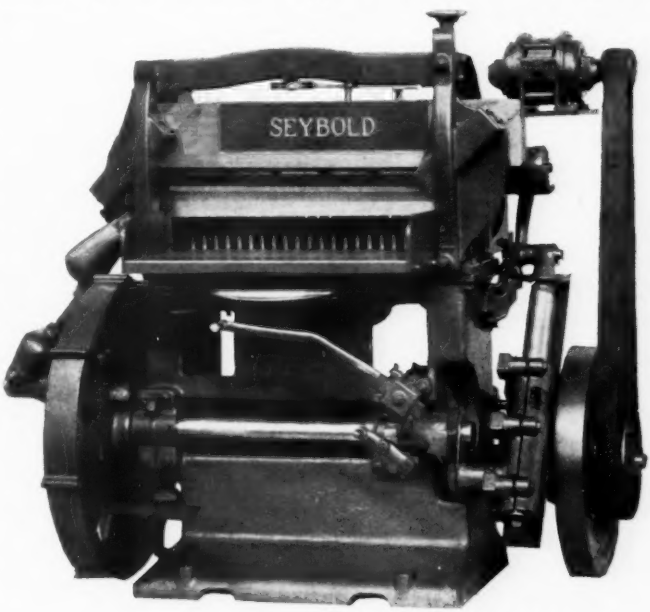
asets consisting of 16 pages of text, or 4 to 8 ages of advertising matter, usually in one olor only.

The details of operation of a modern high eed octuple newspaper press will be of decided erest, and of aid to us later in appreciating e important part that lubrication plays in e maintenance of high speeds and intensive oduction, viz: In general construction such press consists of four distinct printing sections so-called units, which are located in pairs at ach end of the machine. Between these units are the folding devices. Each unit comprises wo plate cylinders, upon which, as previously tated, the curved stereotype plates are securely locked in place; and two mpression cylinders which serve to press the paper against the plate ylinders, their surfaces being cov-red with blankets made especially or obtaining the proper impression. Each plate cylinder carries eight tereotype plates each the size of full newspaper page, so the entire ress has a capacity of sixty-four lates or pages of newsprint when fully dressed" or ready for maxi-um production.

The matter of ink distribution is ne of the most important features press operation. According to ne type of press this may involve ther a set of individual ink rollers r each unit, which take their ink pply from an adjacent fountain, a patented pump system of ink stribution whereby the ink is umped from a supply tank in individual treams (one for each column of print) to the nk distributing cylinders. This latter device eliminates the ink fountain with its accessory fting rollers. In detail such a pump is usually composed of thirty-two small pumps, much on the order of a mechanical force feed lubricator. These pumps work in unison, being directly connected to the distributing cylinder which is in turn driven from the plate cylinder it supplies. Thus the amount of ink supplied is always in direct proportion to the speed of he press. Each individual pump is capable of independent adjustment.

Where an ink fountain is involved each unit is equipped with its individual set of accessory ink rollers. In such an arrangement the ductor or lifting roller alternately dips into the fountain, the ink being subsequently transferred to the distributor rollers which are arranged to travel from side to side across the distributing cylinder with relation to each other, as on a flat bed press. Even distribution and complete breaking up of the ink is thus insured. This vibrating motion is attained by means of suitable cam mechanisms.

Under operation the webs of paper which come in rolls approximately six feet long and about thirty-two inches in diameter are placed either below each press section or at the end of the press, according to the design. The paper then passes in a continuous sheet between the plate and impression cylinders where it is printed first on one side and then on the other. From the press sections the webs or sheets then pass over rollers to the folding mechanism and after being slit along the center, travel over a "V"-shaped former where the first longitudinal fold is brought about. These folded sheets are then cut to page size by a revolving knife cylinder, after which they receive their second or half-page fold. The final step is their delivery



Courtesy of The Seybold Machine Co.

Fig. 9.—Paper and book cutter extensively used for the final trimming of the bound volumes in the bindery. Positive shearing action of the blade insures an even true cut.

onto an endless belt arrangement ready for distribution to the readers. The novel feature of this delivery is the device which pushes out every fiftieth paper a little in advance of the others to simplify counting the products.

In general construction the web press involves much the same mechanical details such as bearings, gearing, and cam devices, as the flat bed press, with the exception that there is no reciprocating motion involved. Therefore, air cushions, bed rollers and tracks are eliminated. The magazine electrotype web press embodies practically the same principles of operation as the newspaper press.

Web Press Lubrication

Although brief, the superficial description of the functions and operating principles of the modern web press brings out the importance of proper lubrication. Most press builders have appreciated this fact and today they equip all important bearings of their machines with self-oiling or ball-bearings, and guard all gears as effectively as possible not only for the safety of the operators but to improve the retention of the gear lubricant as well. The web press involves but bearings, gears and cams, yet the intricacies of every one of these mechanisms with respect to each other, demand the most careful mechanical attention in every detail. A stripped gear, a burned out bearing, or a worn cam anywhere on the press might easily cause partial or complete shutdown, for such parts can not usually be renewed or repaired during operation.

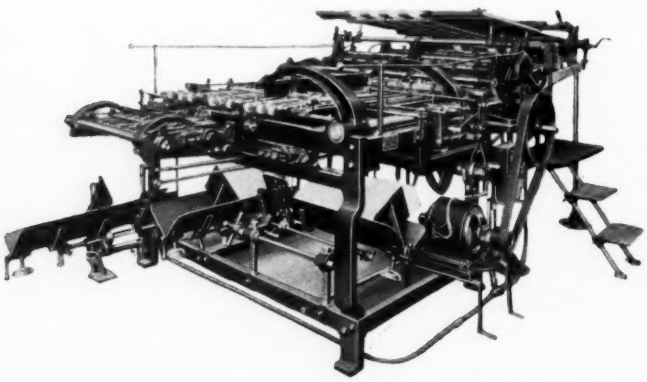
Ball bearings are frequently installed on all cylinders, pipe and compensating rollers, or the rollers over which the web passes in going through the folders, it being essential on such equipment to eliminate the possibility of smudging as much as possible.

Other heavier bearings, such as those carrying the main, intermediate and folder driving shafts, are in most machines nowadays built extra heavy and equipped with self-oiling pillow blocks below the bed plates. Certain presses also have their plate and impression cylinders carried in similar bearings, being so designed that the bearings can be readily removed from the cylinder shafts for inspection without disturbing the cylinders. Where self-oiling bearings are concerned there is little or no possibility for wasted oil, and with the reservoir once charged, effective lubrication should be assured for a period of several weeks. For such service a straight mineral lubricating oil having a viscosity of from 300 to 500 seconds Saybolt at 100° F. will be suitable.

Ball bearings, where oil tight, can be adequately served by a light bodied straight mineral oil free from acid or alkali. Usually a viscosity in the neighborhood of 200 seconds Saybolt is advisable. Where it is not possible to use oil, a light grade of petrolatum or liquid grease will be found satisfactory and capable of being retained in the bearing.

Plain and open bearings are in use on practically all other shafting. In fact in certain presses they are installed throughout the machine. For such service the press oil recommended above for self-oiling bearings will be quite suitable. As in the flat bed press there will always be considerable dripping of lubricating oils from bearings of this character however carefully they may be oiled. Oftentimes adjacent cams and gears will receive the benefit of the greater part of such free oil.

Therefore gear lubrication especially becomes more or less of a problem, just as in the flat bed press, due to the tendency such oils have of washing off the more usual gear compounds. Guarding the gears is advantageous to a certain extent but rarely protects the gear teeth completely.



Courtesy of Dexter Folder Co.

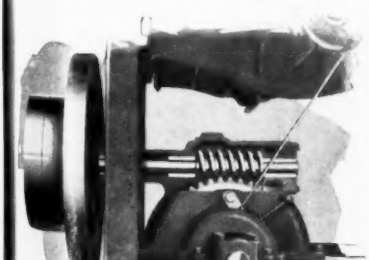
Fig. 10.—A type of book and job folder used in large edition printing for the folding of pages up to a maximum of 16 per sheet.

Where light duty is involved it is quite naturally satisfactory to let this dripped oil serve as the lubricant, adding a little extra to the teeth now and then from an oil can. But heavier gears require a viscous heavy bodied gear lubricant. Many of such compounds are readily reduced by oil and rendered ineffective in a short time. Even certain soap thickened products such as greases suffer in a similar manner.

Therefore, the problem of press gear lubrication may be said to involve a three fold consideration, wherein the grade of lubricant must be selected more or less subordinately to the mechanical construction of the press bearings and the installation of adequate gear guards. Of course, on all gearing, wherever possible, a straight mineral, heavy bodied gear compound will prove the better lubricant by virtue of its economy and adhesive characteristics and its ability to resist squeezing out from between the teeth under abnormal pressures.

IN THE BINDERY

The course which printed matter will follow after it has left the press will depend both upon the type of press involved and the nature of the publication. In the newspaper and magazine industry, for example, pages are usually cut in the press itself, the sheets passing from the cutting or slitting device to a folder to receive the main center or longitudinal fold. In this machine two or more cut pages n ay be superimposed one upon the other if desired, in their proper page order, or the web may otherwise be handled over suitable rollers, etc. to bring about the desired page assembly. In the newspaper pressroom no binding is necessary, the several insets which have been cut, gathered and folded, being assembled as desired, folded once more to half-page in order to facilitate handling, and automatically delivered ready for the newsdealer.



Courtesy of the Chandler & Price Co.

Fig. 11.—Worm and gear drive used on one type of power cutter. The gearing is enclosed. Bath lubrication is thereby possible and advantageous, and insures silent and positive operation.

In the magazine industry, however, the cut and folded insets must be gathered together in proper page order, stitched firmly together, and covered. This operation is usually performed in one series of connecting operations on a machine known as a gatherer, stitcher, and coverer. From the press the insets are delivered in stacks, according to their order of paging, to racks at the feeding side of the gatherer. From these the bottom inset is periodically seized by a set of automatic grippers which are carried by an oscillating arm. To enable the grippers to seize but one inset at a time the bottom one is separated from the stack by means of air suction. This action is made intermittent by use of a suction pump of suitable construction which is driven from the main shaft by a cam.

As each gripper seizes its respective inset it deposits this on a traveling carrier in proper order, on top of the preceding inset. In other words, the first gripper begins the building up of the volume by placing the last inset in the book first upon the carrier. The second gripper deposits its corresponding inset upon that preceding, and so on along the machine, until, at the end the completely gathered volume results. Every motion entailed in the operation of the grippers, suction device and carrier is timed to occur with periodic regularity. On most machines of this type the presence of defective or unevenly cut insets automatically stops the entire machine, and gathering cannot be resumed until the inset in question has been removed.

From the gatherer the assembled insets are delivered to a roll device which sets them upright. They may then pass to a stitcher which fastens them together, volume by volume with wire staples. The modern stitcher is capable of driving from one to four staples simultaneously at a rate of from 60 to 100 per minute, without any cessation in the motion of the book.

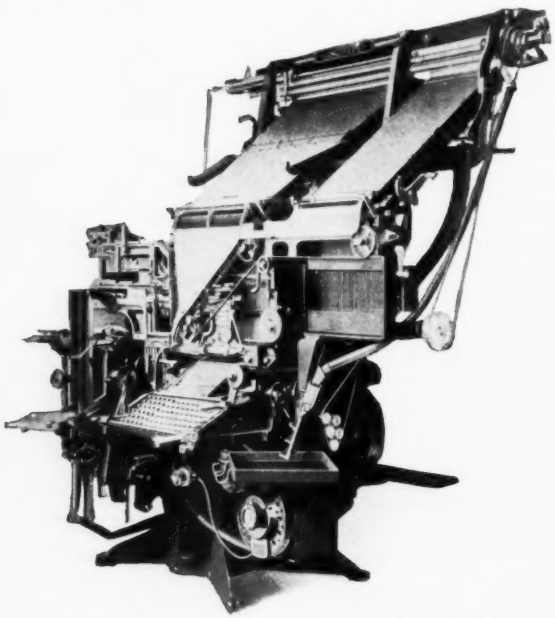
Other binderies eliminate the stitcher in favor of the glued back, in which case the volumes pass to a trimming device, after being gathered and set upright. Here the back edge is trimmed down sufficiently to give a common surface for all the insets, after which the volume is passed through a glue bath. This latter usually oscillates up and down to come into periodic contact with the volumes as they pass

along on the carrier. Where no stitching is used a gauze backing strip is usually put on after gluing. The volume is then ready for covering. The printed covers are usually delivered by a suitable eccentrically operated cam-driven device. Each cover is slid into place under its corresponding volume and then automatically set and pressed into contact with the glued back.

The book is then ready for final trimming, being usually discharged at the delivery end of the covering machine for transmission to the cutters.

Lubrication

Lubrication in the bindery is usually confined to gears, cams and bearings. In general, while a certain amount of heat will be encountered around the gluing machine, few if any lubricating problems will be encountered. Gears and cams can in general be adequately lubricated with the same gear compound used in the press room, since they usually operate exposed and require a heavy adhesive lubricant. Enclosed gearing and worm drives, however, will operate most effectively if they are bath lubricated. For such service a medium bodied straight mineral gear compound of about 200 seconds Saybolt viscosity at 210° F. will be best.



Courtesy Mergenthaler Linotype Co.

Fig. 12.—Single keyboard linotype machine which can be adapted to set both display heads and body type.

Bearings are both grease and oil lubricated according to their location and the intensity of the service. When grease is used it is generally applied by some form of compression grease cup. Oil is usually applied by hand with a squirt can, the refinements of automatic lubrication being in general not adapted to the multitude of smaller gear shaft and cam shaft bearings involved. Here as well as in the pressroom, there will be a tendency for dripping of oils from over-lubricated bearings; therefore the essential factor in order to insure the operators against falls on an oil soaked floor, is to lubricate sparingly. The usual oil employed in the pressroom is adaptable to all bearings, etc. in the bindery.

Miscellaneous Other Machinery

In the modern printing establishment there is in addition considerable other machinery involved. For example, we have the linotype and monotype machines in the composing room; the presses, plate curving machines, routers, planers and saws used in the stereotype or electrotype foundry; folding, cutting and automatic paper feeding devices which often operate independently of the printing presses; electric motors throughout the plant; and various other types of presses such as the sheet rotary press, etc. which are often encountered.

Space limitation prevents a detailed description of such machinery. In brief, however, we may state that the principles of lubrication have all been covered in the discussion of the few important heavier units usually involved. As is generally true throughout the industry, automatic lubricating devices are seldom installed, due to the considerable number and variety of smaller bearings, driving gears, and cam mechanisms employed. So hand lubrication, or at best the installation of an oil or grease cup here or there, is general practice.

While speeds are often high, pressures are relatively low, and bearings are built either open or with sufficient clearance to insure against any excessive overheating. So on auxiliary machinery, as in the pressroom, the essential problem may be said to involve the manner of application of the lubricant rather than the selection of such products to meet specific conditions.

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